

DOCKET NO: 295335US0PCT

IN THE UNITED STATES PATENT & TRADEMARK OFFICE

IN RE APPLICATION OF	:
KARL OTT, ET AL.	: EXAMINER: EASHOO, MARK
SERIAL NO: 10/591,662	:
FILED: SEPTEMBER 5, 2006	: GROUP ART UNIT: 1796
FOR: NOVEL SOLVENT FOR PRODUCING POLYURETHANE DISPERSIONS	:

APPEAL BRIEF

COMMISSIONER FOR PATENTS
ALEXANDRIA, VIRGINIA 22313

SIR:

This is an appeal of the Final Rejection dated June 16, 2010. A Notice of Appeal was timely filed on September 16, 2010.

I. REAL PARTY IN INTEREST

The real party in interest in this appeal is BASF SE, having an address of Ludwigshafen 67056, Germany.

II. RELATED APPEALS AND INTERFERENCES

Appellants, Appellants' legal representative and the assignee are aware of no appeals, interferences, or judicial proceedings which may be related to, directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

III. STATUS OF THE CLAIMS

Claims 15-25 stand twice rejected and are herein appealed. Claims 1-14 are canceled.

IV. STATUS OF THE AMENDMENTS

No amendment under 37 CFR 1.116 has been filed. A Request for Reconsideration filed August 16, 2010, is in the record.

V. SUMMARY OF THE CLAIMED SUBJECT MATTER

It is preliminarily noted that references in brackets are to page and line number of the specification as filed.

Independent Claim 15 provides a process for preparing an aqueous polyurethane dispersion wherein before being dispersed, the polyurethane is produced in the presence of N-ethylpyrrolidone or N-cyclohexylpyrrolidone [page 2, lines 8-15 and 30]. The prepared polyurethane comprises at least one hydrophilic group or a group which can be converted to a hydrophilic group [page 3, lines 18-21; page 10, lines 1-12]. The polyurethane thus prepared in the presence of N-ethylpyrrolidone or N-cyclohexylpyrrolidone is then dispersed in an aqueous medium [page 3, line 24; page 15, lines 5-13].

Appellants have described that first preparing the polyurethane in the presence of N-ethylpyrrolidone or N-cyclohexylpyrrolidone followed by dispersion in an aqueous medium

provides performance advantages not achieved by conventional technology where a solvent is added to the dispersion after its preparation to adjust the physical parameters of the finished dispersion [page 16, lines 21-40].

Claims 16-24 depend from Claim 15 and stand or fall with the independent claim.

Independent Claim 25 describes a method for preparing an aqueous dispersion of a water dispersible polyurethane wherein N-ethylpyrrolidone or N-cyclohexylpyrrolidone is added to the reaction mixture for forming the water dispersible polyurethane [page 2, lines 8-15 and 30]. The arguments presented below equally apply to this claim and the two independent claims are argued together.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Claims 15-25 are twice rejected under 35 U.S.C. 103(a) as being unpatentable over Bruchmann et al. (DE 10161156; equivalent to U.S. 2005/0043467) in view of Galan et al. (U.S. 4,757,095).

VII. ARGUMENT

Rejection of Claims 15-25 under 35 U.S.C. 103(a) as being unpatentable over Bruchmann et al. (DE 10161156; equivalent to U.S. 2005/0043467) in view of Galan et al. (U.S. 4,757,095).

Bruchmann describes an aqueous dispersion of a water dispersible polyurethane and a process for preparing the aqueous dispersion involving reacting the monomers in the presence of a cesium salt.

The cesium salts are preferably added in dissolved form in suitable solvents [0079] and solvents are useful to ensure a low viscosity [0080]. Bruchmann describes two

polyurethane preparation methods: 1) acetone process [0083] and 2) prepolymer process [0083-0084].

The Office has alleged that the two methods do not require the same solvents (Official Action dated June 16, 2010, page 3, last paragraph) and implies that the acetone process requires a larger amount of solvent. In the Advisory Action dated September 7, 2010, (page 2, lines 5-7) the Examiner alleges concludes the following:

It is submitted that the prepolymer process does not require an organic solvent and that the catalyst would be capable of being incorporated into the prepolymer process as taught by Bruchmann.

Appellants respectfully submit that there is no technical support for such an interpretation as not only catalyst solubility and viscosity requirements would require solvent in both processes, but as one of ordinary technical skill would recognize, polymerization, even to prepolymer level would yield large molecules which would solidify in the absence of solvents and thus be unsuitable for further processing unless dissolved in a solvent.

Appellants have described in the specification (page 1, lines 9-36) that polyurethane prepolymers are conventionally prepared in organic solvents and descriptive examples of prepolymer processes are provided in the references cited in this description.

Appellants further note that Bruchmann states in [0084]:

The prepolymer mixing process differs from the acetone process in that rather than a fully reacted (potentially) ionic polyurethane it is a prepolymer carrying isocyanate groups which is prepared first of all.

Appellants submit that as would be understood by one of ordinary skill in the art, Bruchmann is describing that the two processes differ in the degree of polymerization and is not indicating an absence of solvent in the prepolymer technique. Appellants therefore submit that the Examiner has misunderstood and/or misinterpreted the meaning of the Bruchmann description.

Bruchmann indicates a preferred solvent should have a boiling point of from 40 to 100°C. under atmospheric pressure [0081] and Appellants submit that one of ordinary skill in the art would recognize that having a boiling point in the described range would allow for facile removal by distillation under reduced pressure as described for both methods of preparation. Bruchmann describes solvent removal from the dispersion, after the aqueous dispersion is prepared. Further removal to a level of less than 10% is preferred [0085]. Nowhere does Bruchmann disclose or suggest keeping the solvent in low concentration in order to eliminate removal later as such a procedure may render the Bruchmann process unsuitable for preparing the intended dispersion because of high viscosity or even solidification.

Appellants have shown that the boiling points of N-ethylpyrrolidone and N-cyclohexylpyrrolidone are 97 °C/20mm Hg and 154 °C/7 mm Hg respectively. Therefore, one of ordinary skill in the art would recognize that the claimed components do not have the boiling point properties suggested by Bruchmann. Nowhere does this reference disclose or suggest the addition of N-ethyl- or N-cyclohexylpyrrolidone to the preparation of the prepolymer mixture.

The Office speculates that one of ordinary skill would employ less than 10% of N-ethylpyrrolidone in a prepolymer aqueous process according to Bruchmann based on the description of Galan which is directed to a non-aqueous process and based on a skilled artisan's recognition that since Bruchmann describes solvent distillation to a level less than 10%, such would be advantageous. This speculation does not recognize the impact of solvent on the polymerization described above. Moreover, Bruchmann describes removal of the solvent from the **dispersion**, i.e., after addition of water [0085].

As described above, Appellants submit that Bruchmann requires solvent to dissolve the catalyst and to maintain a low viscosity and therefore, the suggestion of a solvent free pre-polymer process made by the Office cannot be based on rational logic.

Appellants note that in reversing an obviousness rejection in *Ex parte* SUSUMU TANAKA and YASUO MURAKAMI (Appeal 2007-3845; Decided: March 28, 2008) the Board of Patent Appeals and Interferences stated:

In order to establish a prima facie case of obviousness, the Examiner must show that each and every limitation of the claim is described or suggested by the prior art or would have been obvious based on the knowledge of those of ordinary skill in the art. *In re Fine*, 837 F.2d 1071, 1074 (Fed. Cir. 1988). “[R]ejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.” *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)(Bold added for emphasis)

Galan is directed to a non-aqueous technology (microcellular foam systems) employing polymers not specifically composed to be water dispersible and therefore does not describe or suggest a method for preparing an aqueous dispersion. Galan is directed to polyurethanes for injection molding (Col. 1, lines 30-35; Col. 7, lines 55-56) and thus is not directed to or interested an aqueous dispersion. Thus, Appellants submit that Galan does not pertain to the same field of endeavor, does not deal with the same problems as Bruchmann and therefore, is directed to an art nonanalogous to that of Bruchmann. Nowhere does this reference disclose that the polyurethane is water dispersible nor is there any suggestion regarding water dispersibility of the polymer composition.

Moreover, Appellants further submit that Galan describes a method for making polyurethanes with lactams as a reactant. Claims 1 and 11 state:

. . . a reaction product of a mixture of diphenylmethane diisocyanate and uretonimine modified diphenylmethane diisocyanate . . . , a polyol . . . , with a compound selected from . . . a lactone . . . and a lactam . . .

Appellants submit that a lactam is thus chemically incorporated into the polyurethane. In contrast, according to the claimed invention, a polyurethane is prepared in the presence of N-ethylpyrrolidone or N-cyclohexylpyrrolidone, i.e., the N-ethylpyrrolidone or N-cyclohexylpyrrolidone are present as a solvent, but not as a reactant.

Appellants submit that the Office has mistakenly interpreted the Bruchmann description and alleged running the reaction at less 10% N-ethyl- or N-cyclohexylpyrrolidone with no support from either cited reference. However, **in hindsight of the present invention** the Office alleges such a process is obvious.

When prior art references require selective combination by the court to render obvious a subsequent invention, there must be some reason for the combination other than hindsight gleaned from the invention itself. *Interconnect Planning Corp.* 774 F.2d, 1143, 227 USPQ 551.

Something in the prior art as a whole must suggest the desirability, and thus the obviousness, of making the combination. *Lindemann Maschinenfabrik GmbH v. American Hoist and Derrick Co.* 730 F.2d 1452, 1462, 221 USPQ 481, 488 (Fed. Cir. 1984)

Appellants respectfully submit that only in hindsight, in view of the claimed invention, would one of ordinary skill in the art combine the cited references. The Office has not provided any reasonable explanation of how or why one of ordinary skill in the art would have combined the cited references to obtain the claimed invention, at the time of the present invention.

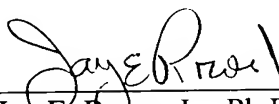
In view of all the above, Appellants respectfully submit that the cited combination of references does not describe the elements of the present invention and therefore a conclusion of obviousness cannot be supported. Accordingly, the rejection of Claims 15-25 under 35 U.S.C. 103(a) over Bruchmann in view of Galan should be reversed.

CONCLUSION

For all the above reasons, the rejection of Claims 15-25 under 35 U.S.C. 103(a) as being unpatentable over Bruchmann et al. (DE 10161156; equivalent to U.S. 2005/0043467) in view of Galan et al. (U.S. 4,757,095) should be reversed.

Respectfully submitted,

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VIII. CLAIMS APPENDIX

Claims 1-14 (Canceled).

Claim 15 (Rejected): A process for preparing an aqueous polyurethane dispersion, comprising:

preparing a polyurethane in the presence of N-ethylpyrrolidone or N-cyclohexylpyrrolidone; and

dispersing the prepared polyurethane in an aqueous medium,

wherein

the polyurethane comprises at least one component having at least one hydrophilic group or a group which can be converted to a hydrophilic group, and is dispersible in water.

Claim 16 (Rejected): The process according to claim 15, wherein the preparing a polyurethane in the presence of N-ethylpyrrolidone or N-cyclohexylpyrrolidone comprises reacting

- a) at least one polyfunctional isocyanate having 4 to 30 carbon atoms,
- b) diols comprising
 - b1) 10 to 100 mol%, based on the total amount of diols (b),
having a molecular weight of from 500 to 5000 and
 - b2) 0 to 90 mol%, based on the total amount of diols (b),
having a molecular weight of from 60 to 500 g/mol,
- c) optionally additional polyfunctional compounds, other than the diols (b), containing reactive groups which are alcoholic hydroxyl groups or primary or secondary amino groups and

d) monomers other than the monomers a), b) and c), containing at least one isocyanate group or at least one isocyanato-reactive group, additionally carrying at least one hydrophilic group or a group which can be converted to a hydrophilic group.

Claim 17 (Rejected): The process according to claim 16, wherein component d) is at least one hydroxycarboxylic acid.

Claim 18 (Rejected): The process according to claim 17, wherein the at least one hydroxycarboxylic acid is a dihydroxyalkylcarboxylic acid.

Claim 19 (Rejected): The process according to claim 17, wherein the at least one hydroxycarboxylic acid is an α,α -bis(hydroxymethyl)-carboxylic acid.

Claim 20 (Rejected): The process according to claim 17, wherein the at least one hydroxycarboxylic acid is at least one selected from the group consisting of dimethylolbutyric acid and dimethylolpropionic acid.

Claim 21 (Rejected): The process according to claim 20, wherein the at least one hydroxycarboxylic acid is dimethylolpropionic acid.

Claim 22 (Rejected): The process according to claim 16, wherein the hydrophilic group of components d) comprises nonionic and ionic groups.

Claim 23 (Rejected): The process according to claim 15, wherein the polyurethane is prepared in the presence of at least one cesium salt.

Claim 24 (Rejected): A method for coating or adhesively bonding a material, comprising applying the aqueous polyurethane dispersion prepared according to Claim 15 to the material,

wherein the material is at least one selected from the group consisting of wood, wood veneer, paper, paperboard, cardboard, textile, leather, nonwoven, plastics surfaces, glass, ceramic, mineral building materials, uncoated metals and coated metals.

Claim 25 (Rejected): A method for preparing an aqueous dispersion of a water dispersible polyurethane comprising adding N-ethylpyrrolidone or N-cyclohexylpyrrolidone to a reaction mixture for forming the water dispersible polyurethanes.

IX. EVIDENCE APPENDIX

Exhibit A: 232254; 1-Cyclohexyl-2-pyrrolidone; Sigma-Aldrich online product description.

Exhibit B: 146358; 1-Ethyl-2-pyrrolidone; Sigma-Aldrich online product description.

X. RELATED PROCEEDINGS APPENDIX

None

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EXHIBIT - A

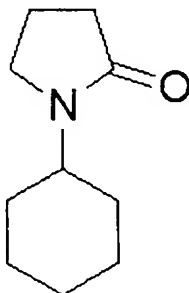
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- **232254 (Aldrich)**

232254

Aldrich

1-Cyclohexyl-2-pyrrolidone

High-boiling aprotic solvent., 99%

Price and Availability

Product Number	Your Price USD	Available to Ship	Quantity	Actions
232254-100G	24.30	05/29/2009 details...	<input type="text"/>	

CAS Number:	6837-24-7
Linear Formula:	C ₁₀ H ₁₇ NO
Molecular Weight:	167.25
Beilstein Registry Number:	121832
EC Number:	229-919-7
MDL number:	MFCD00003191
PubChem Substance ID:	24853888

[Specifications](#)[Related Products](#)[References](#)**Description**

Application useful for extractions, separations and purifications in a wide range of

Packaging 1 kg in glass btl
 5, 100 g in glass btl

Properties

vapor pressure	0.05 mmHg (25 °C)
assay	99%
refractive index	<i>n</i> _{20/D} 1.499(lit.)
bp	154 °C/7 mmHg(lit.)
density	1.007 g/mL at 25 °C(lit.)

Safety

Hazard Codes	Xn
Risk Statements	22
Safety Statements	23-24/25
RIDADR	UN 2810 6.1/PG 2
WGK Germany	1
RTECS	UY5748450
Flash Point(F)	286 °F

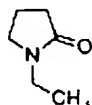
Flash Point(C)	141 °C
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- [146358 \(Aldrich\)](#)
- [232254 \(Aldrich\)](#)

146358

Aldrich

1-Ethyl-2-pyrrolidone

98%

Price and Availability

Product Number	Your Price USD	Available to Ship	Quantity	Actions
146358-5G	17.40	05/29/2009 details...	<input type="text"/>	
146358-100G	114.00	Date not Available details...	<input type="text"/>	
146358-500G	367.00	Date not Available details...	<input type="text"/>	

CAS Number:

2687-91-4

Linear Formula:C₆H₁₁NO**Molecular Weight:**

113.16

Beilstein Registry Number:

107971

EC Number:

220-250-6

MDL number:

MFCD00003199

PubChem Substance ID:

24848778

[Specifications](#)[Related Products](#)[References](#)**Description**

Packaging 5, 100, 500 g in glass btl

Properties

assay	98%
refractive index	<i>n</i> _{20/D} 1.465(lit.)
bp	97 °C/20 mmHg(lit.)
density	0.992 g/mL at 25 °C(lit.)

Safety

Personal Protective Equipment Eyeshields, Gloves, Respirators

Hazard Codes Xn

Risk Statements 22-36

Safety Statements 26

WGK Germany 1

RTECS UY5769250

Flash Point(F) 168.8 °F

Flash Point(C) 76 °C

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